Critical Systems Engineering 2000

Week: 1

Course topic: Introduction to Critical Systems Engineering

Objective: To introduce the concept of a 'critical' system and to discuss, in outline, the software and systems engineering processes that may be used in the development of these systems.

Essential reading: "Software Engineering", 5th edition. Chapter 2
"Software Engineering", 5th edition. Chapter 21, section 21.1.

Background reading: "Systems Engineering: Coping with Complexity". Chapter 1
Stevens, Brook, Jackson and Arnold

Web resources: http://info.comp.lancs.ac.uk/year3/notes/options/365/index.htm

Self-test:

1. What is a socio-technical system?
2. Give 3 examples of socio-technical systems
3. What are emergent properties?
4. Explain why emergent properties are often system-wide properties
5. What are possible roles for software in socio-technical systems?
6. What are the stages in the systems engineering life cycle?
7. Explain why systems problems often have to be solved in software
8. What is a critical system?
9. What are the major classes of critical system?
10. Give 2 examples of systems from each of these classes?
11. Why is the failure of a critical system often very expensive?
12. What are critical emergent properties?
13. Why should more rigorous development techniques be used for critical systems development?
14. Why is a personal insulin pump a critical system?
15. Explain how the insulin pump software decides if a dose of insulin should be delivered.